

## Solving Quadratic Equations By Completing the Square Date \_\_\_\_\_ Period \_\_\_\_\_

Solve each equation by completing the square.

1)  $v^2 + 10v - 21 = 0$

$$v^2 + 10v = 21$$

$$v^2 + 10v + 25 = 21 + 25$$

$$(v + 5)^2 = 46$$

$$v + 5 = \pm \sqrt{46}$$

$$v = -5 \pm \sqrt{46}$$

2)  $b^2 - 4b - 12 = 0$

$$b^2 - 4b = 12$$

$$b^2 - 4b + 4 = 12 + 4$$

$$(b - 2)^2 = 16$$

$$b - 2 = \pm \sqrt{16}$$

$$b = 2 \pm 4$$

$$\{-2, 6\}$$

3)  $v^2 - 14v - 44 = 0$

$$v^2 - 14v = 44$$

$$v^2 - 14v + 49 = 44 + 49$$

$$(v - 7)^2 = 93$$

$$v - 7 = \pm \sqrt{93}$$

$$v = 7 \pm \sqrt{93}$$

4)  $v^2 - 2v - 35 = 0$

$$v^2 - 2v = 35$$

$$v^2 - 2v + 1 = 35 + 1$$

$$(v - 1)^2 = 36$$

$$v - 1 = \pm \sqrt{36}$$

$$v = 1 \pm 6$$

$$\{-5, 7\}$$

5)  $r^2 + 4r - 56 = 0$

$$r^2 + 4r = 56$$

$$r^2 + 4r + 4 = 56 + 4$$

$$(r + 2)^2 = 60$$

$$r + 2 = \pm \sqrt{60}$$

$$r = -2 \pm 2\sqrt{15}$$

6)  $x^2 - 12x - 10 = 0$

$$x^2 - 12x = 10$$

$$x^2 - 12x + 36 = 10 + 36$$

$$(x - 6)^2 = 46$$

$$x - 6 = \pm \sqrt{46}$$

$$x = 6 \pm \sqrt{46}$$

7)  $n^2 - 4n + 57 = -5$

$$n^2 - 4n = -62$$

$$n^2 - 4n + 4 = -62 + 4$$

$$(n - 2)^2 = -58$$

$$n - 2 = \pm \sqrt{58}$$

$$n = 2 \pm \sqrt{58}$$

8)  $n^2 - 4n + 5 = 8$

$$n^2 - 4n = 3$$

$$n^2 - 4n + 4 = 3 + 4$$

$$(n - 2)^2 = 7$$

$$n - 2 = \pm \sqrt{7}$$

$$n = 2 \pm \sqrt{7}$$

$$9) n^2 - 95 = 14n$$

Day 4/2

$$10) n^2 = -93 - 2n$$

$$n^2 - 14n = 95$$

$$n^2 - 14n + 49 = 95 + 49$$

$$(n-7)^2 = 144$$

$$n-7 = \pm\sqrt{144}$$

$$n = 7 \pm 12 \quad \{19, -5\}$$

$$n^2 + 2n = -93$$

$$n^2 + 2n + 1 = -93 + 1$$

$$(n+1)^2 = -92$$

$$n+1 = \pm\sqrt{-92}$$

$$n = -1 \pm 2i\sqrt{23}$$

$$11) 9n^2 = -77 + 18n$$

$$9n^2 - 18n = -77$$

$$n^2 - 2n = -\frac{77}{9}$$

$$n^2 - 2n + 1 = -\frac{77}{9} + \frac{1}{9}$$

$$(n-1)^2 = -\frac{68}{9} \quad n = 1 \pm \frac{2i\sqrt{17}}{3}$$

$$n-1 = \pm\sqrt{-\frac{68}{9}}$$

$$n = \frac{3 \pm 2i\sqrt{17}}{3}$$

$$12) 9v^2 + 5 = 18v$$

$$9v^2 - 18v = -5$$

$$v^2 - 2v = -\frac{5}{9}$$

$$v^2 - 2v + 1 = -\frac{5}{9} + \frac{1}{9}$$

$$(v-1)^2 = \frac{4}{9}$$

$$v-1 = \pm\sqrt{\frac{4}{9}}$$

$$v = 1 \pm \frac{2}{3}$$

$$\left\{\frac{5}{3}, \frac{1}{3}\right\}$$

$$13) 4n^2 + 31 = -8n$$

$$4n^2 + 8n = -31$$

$$n^2 + 2n = -\frac{31}{4}$$

$$n^2 + 2n + 1 = -\frac{31}{4} + \frac{1}{4}$$

$$(n+1)^2 = -\frac{27}{4}$$

$$n+1 = \pm\sqrt{-\frac{27}{4}}$$

$$n = -1 \pm \frac{3i\sqrt{3}}{2}$$

$$n = \frac{-2 \pm 3i\sqrt{3}}{2}$$

$$14) 6k^2 = -12k + 18$$

$$6k^2 + 12k = 18$$

$$k^2 + 2k = 3$$

$$k^2 + 2k + 1 = 3 + 1$$

$$(k+1)^2 = 4$$

$$k+1 = \pm\sqrt{4}$$

$$k = -1 \pm 2$$

$$\{3, 1\}$$

$$15) 9m^2 - 20m - 21 = 0$$

$$9m^2 - 20m = 21$$

$$m^2 - \frac{20}{9}m = \frac{21}{9}$$

$$m^2 - \frac{20}{9}m + \frac{100}{81} = \frac{189}{81} + \frac{100}{81}$$

$$\left\{3, -\frac{7}{9}\right\}$$

$$16) 10x^2 - 4x - 32 = 0$$

$$5x^2 - 2x = 16$$

$$x^2 - \frac{2}{5}x = \frac{16}{5}$$

$$x^2 - \frac{2}{5}x + \frac{1}{25} = \frac{80}{25} + \frac{1}{25}$$

$$(x - \frac{1}{5})^2 = \frac{81}{25}$$

$$x = \frac{1}{5} \pm \frac{9}{5}$$

$$\left\{2, -\frac{8}{5}\right\}$$

$$17) 3x^2 + 9x + 9 = 3$$

$$x^2 + 3x + 3 = 1$$

$$x^2 + 3x = -2$$

$$x^2 + 3x + \frac{9}{4} = -\frac{8}{4} + \frac{9}{4}$$

$$(x + \frac{3}{2})^2 = \frac{1}{4}$$

$$x + \frac{3}{2} = \pm\frac{1}{2}$$

$$x = -\frac{3}{2} \pm \frac{1}{2}$$

$$\{-1, -2\}$$

$$18) 4n^2 + 4n = -24$$

$$n^2 + n = -6$$

$$n^2 + n + \frac{1}{4} = -\frac{24}{4} + \frac{1}{4}$$

$$(n + \frac{1}{2})^2 = -\frac{23}{4}$$

$$n + \frac{1}{2} = \pm\sqrt{-\frac{23}{4}}$$

$$n = -\frac{1}{2} \pm \frac{i\sqrt{23}}{2}$$

# Unit 8 Day 2 p 118 : 17-22 (all)

$$(17) p^2 - 8p + 15 = 0$$

$$(4) p^2 - 8p = -15$$

$$p^2 - 8p + 16 = -15 + 16$$

$$(p-4)^2 = 1$$

$$p-4 = \pm\sqrt{1}$$

$$p = 4 \pm 1$$

$$\{5, 3\}$$

$$(18) m^2 + 5m = 6$$

$$\left(\frac{5}{2}\right)^2 m^2 + 5m + \frac{25}{4} = 6 + \frac{25}{4}$$

$$\left(m + \frac{5}{2}\right)^2 = \frac{49}{4}$$

$$m + \frac{5}{2} = \pm\sqrt{\frac{49}{4}}$$

$$m = -\frac{5}{2} \pm \frac{7}{2}$$

$$\{1, -6\}$$

$$(19) x^2 - 2x - 4 = 0$$

$$x^2 - 2x = 4$$

$$x^2 - 2x + 1 = 4 + 1$$

$$(x-1)^2 = 5$$

$$x-1 = \pm\sqrt{5}$$

$$x = 1 \pm \sqrt{5}$$

$$(20) r^2 + 8r + 13 = 0$$

$$r^2 + 8r + 16 = -13 + 16$$

$$(r+4)^2 = 3$$

$$r+4 = \pm\sqrt{3}$$

$$r = -4 \pm \sqrt{3}$$

$$(21) 2p^2 + 2p + 1 = 0$$

$$p^2 + p + \frac{1}{2} = 0$$

$$p^2 + p = -\frac{1}{2}$$

$$p^2 + p + \frac{1}{4} = -\frac{1}{2} + \frac{1}{4}$$

$$\left(p + \frac{1}{2}\right)^2 = -\frac{1}{4}$$

$$p + \frac{1}{2} = \pm\sqrt{-\frac{1}{4}}$$

$$p = -\frac{1}{2} \pm \frac{i}{2}$$

$$(22) 9z^2 - 12z + 8 = 0$$

$$9z^2 - 12z + 8 = 0$$

$$z^2 - \frac{4}{3}z + \frac{8}{9} = 0$$

$$z^2 - \frac{4}{3}z = -\frac{8}{9}$$

$$\left(\frac{2}{3}\right)^2$$

$$z^2 - \frac{4}{3}z + \frac{4}{9} = -\frac{8}{9} + \frac{4}{9}$$

$$\left(z - \frac{2}{3}\right)^2 = -\frac{4}{9}$$

$$z - \frac{2}{3} = \pm\sqrt{-\frac{4}{9}}$$

$$z - \frac{2}{3} = \pm\frac{2}{3}i$$

$$z = \frac{2}{3} \pm \frac{2}{3}i$$